



DO LACTOSE INTOLERANT INDIVIDUALS EFFICIENTLY ABSORB PROTEIN FROM ACUTE MILK CONSUMPTION?

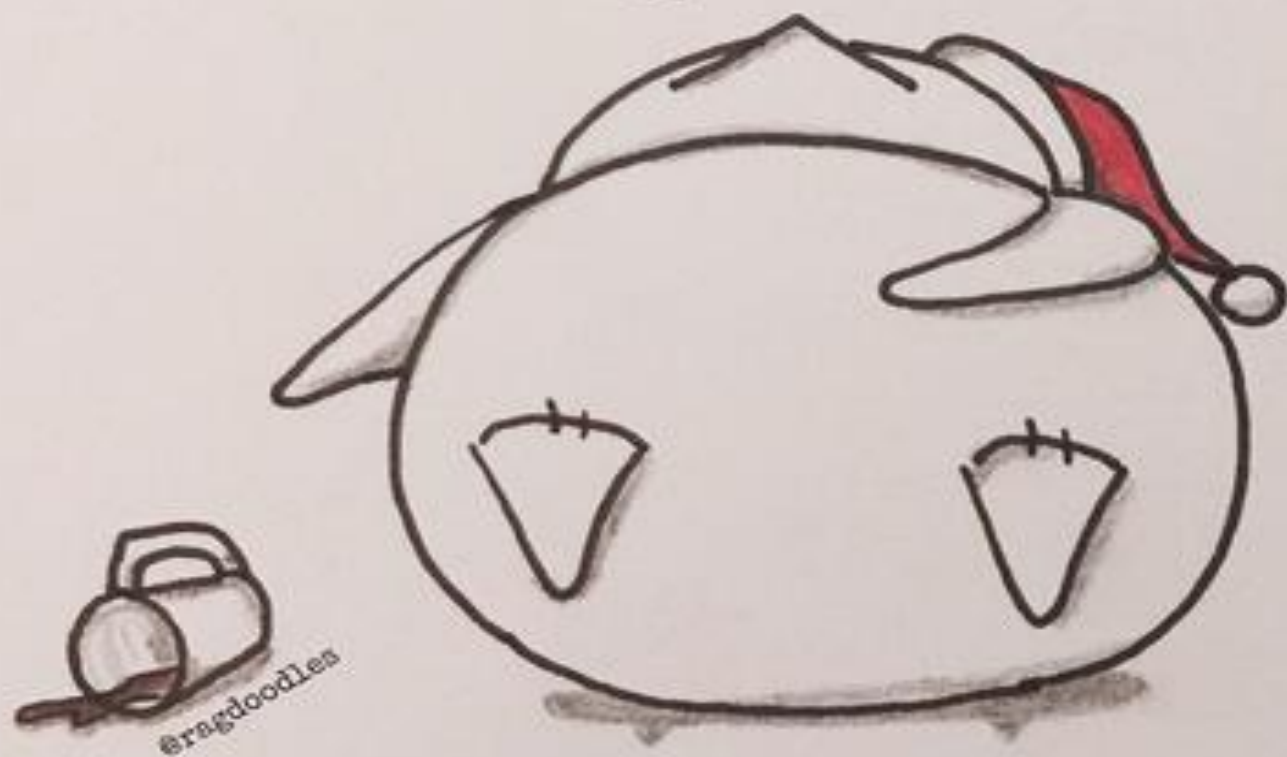
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PhD Student

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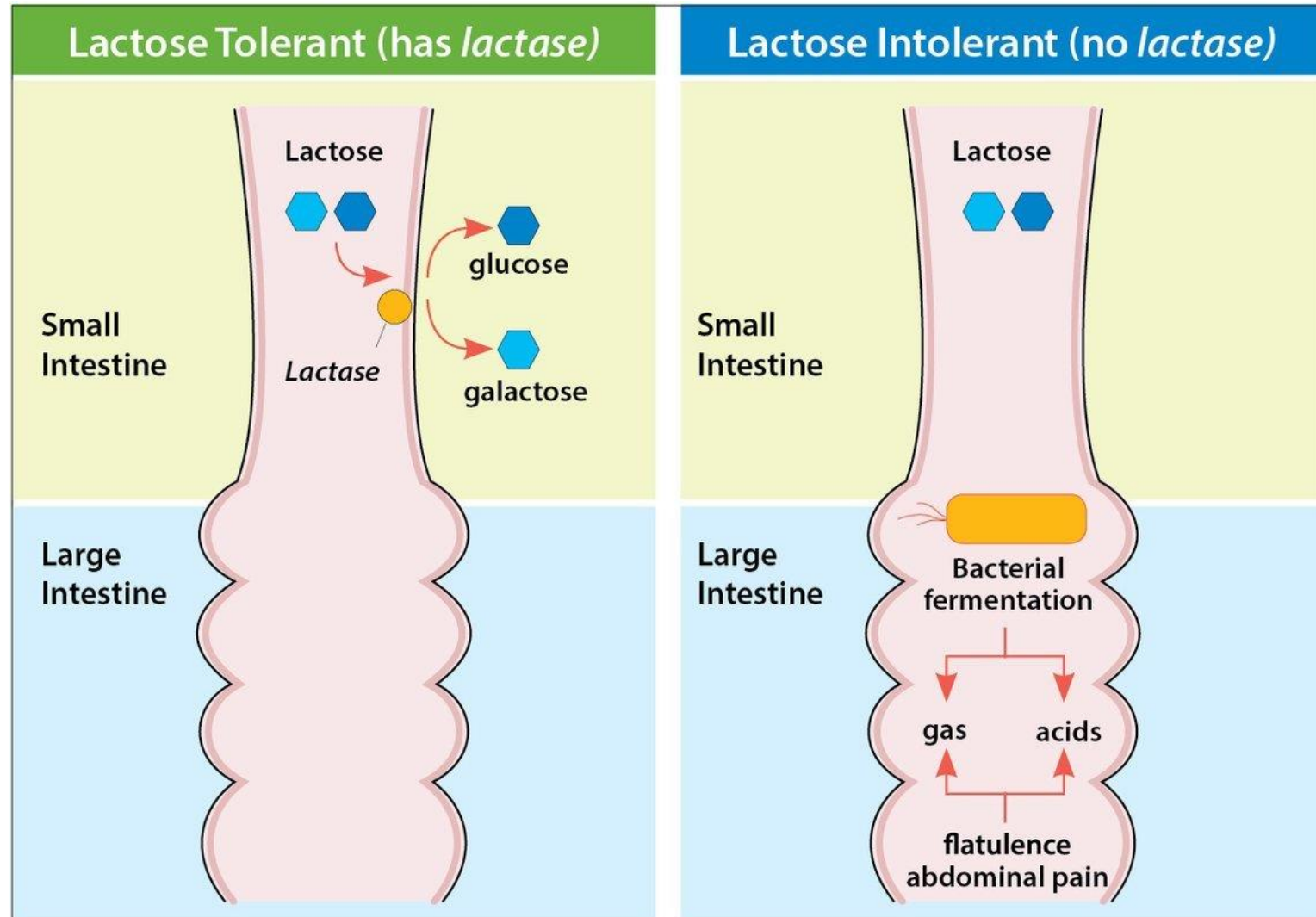
University of Auckland

Someone added
milk to my coffee.

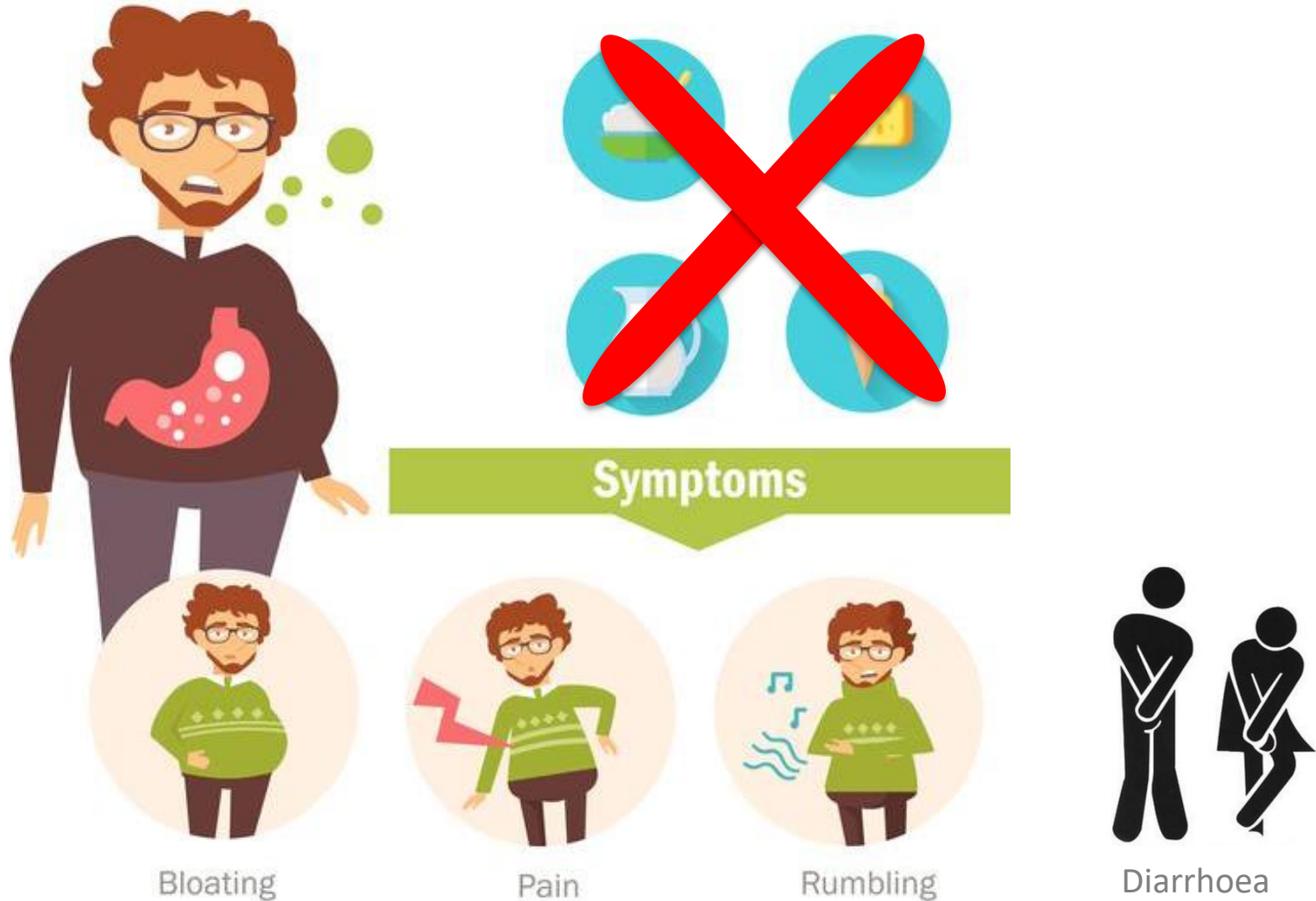


'Lactose Intolerance'

What happens when you drink milk?



What happens when you drink milk?



Milk in Human Health



Calcium

Vitamin A

Phosphorus

Riboflavin

Protein

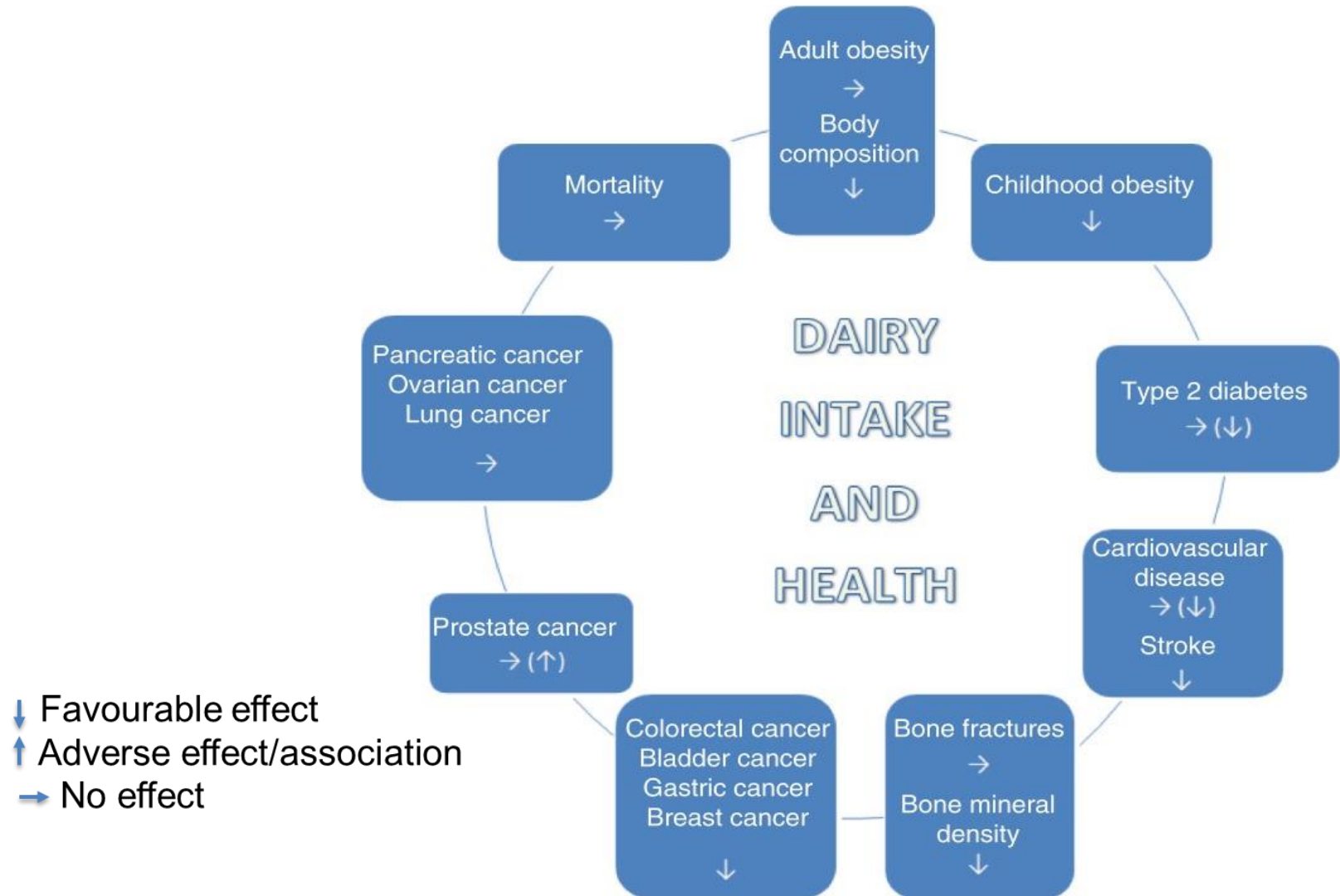
**Vitamin
B12**

Niacin

Fat

Vitamin D

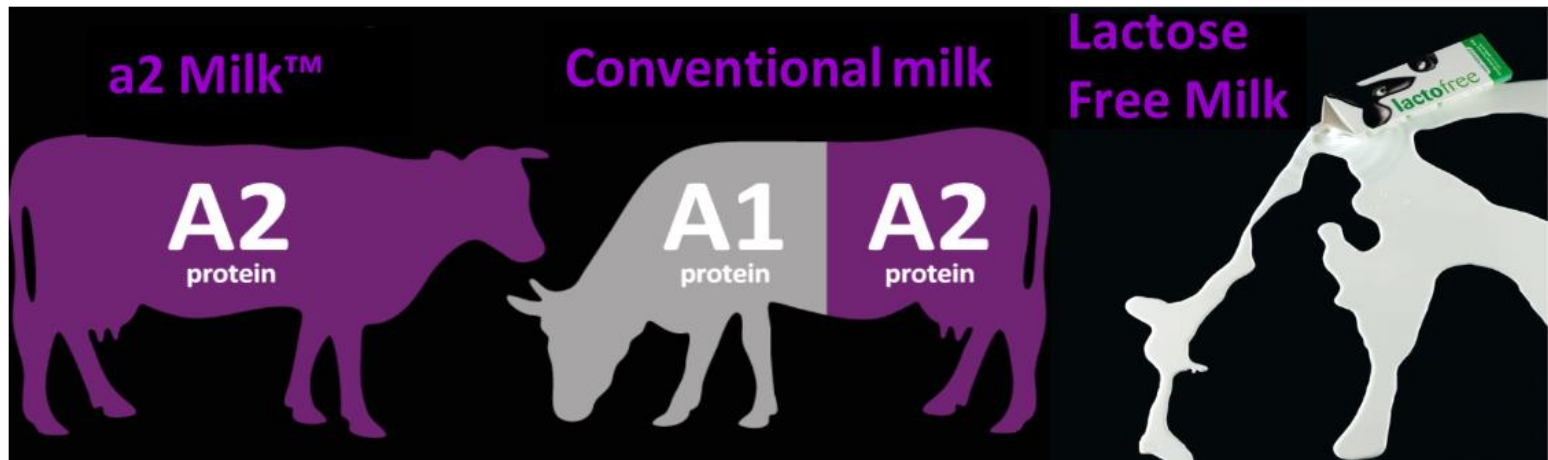
Milk in Human Health



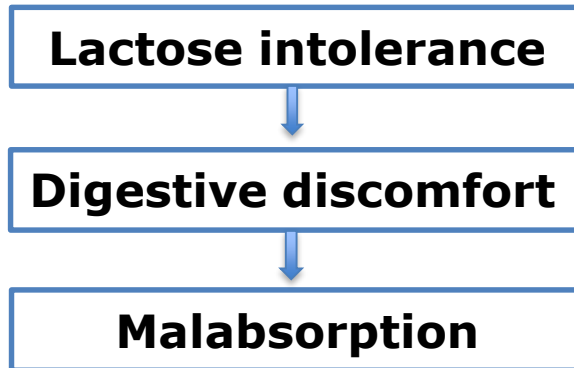
Thorning, Tanja Kongerslev et al. "Milk and Dairy Products: Good or Bad for Human Health? An Assessment of the Totality of Scientific Evidence." Food & Nutrition Research 60 (2016): 10.3402/fnr.v60.32527. PMC. Web. 18 Oct. 2017.

Choices for Lactose Intolerants

- Lactose-free milk 🍌
- a2 Milk™ 🤔
- Conventional milk 🤔



What is known



Aims



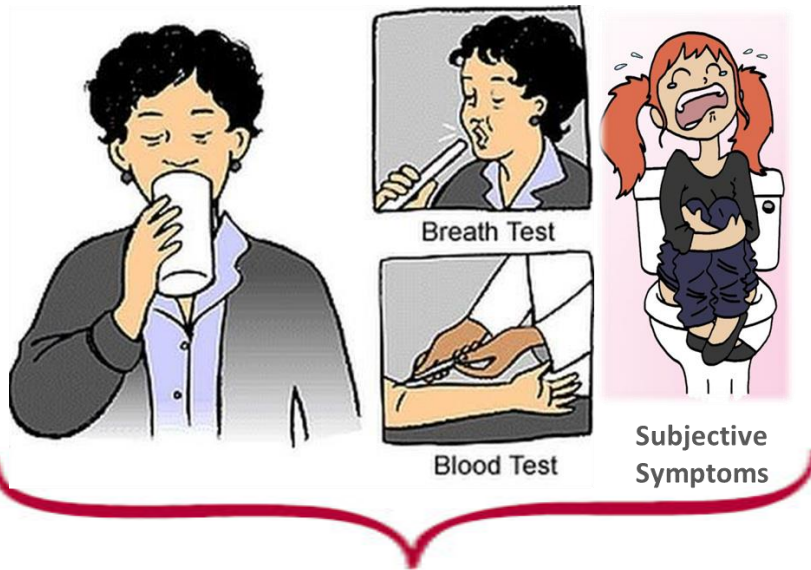
- Protein digestion ?
- Amino acid (AA) absorption ?
- Gastrointestinal transit ?

Hypotheses

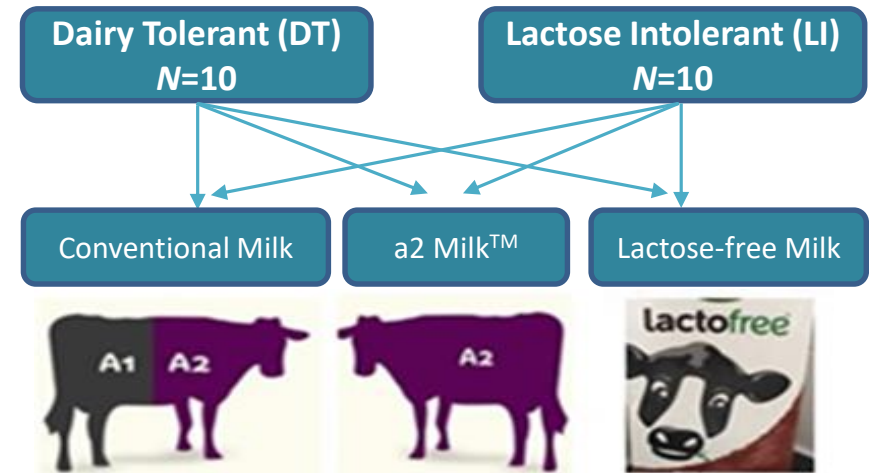
- Lactose-free milk will improve protein digestion and AA absorption in LI individuals compared to conventional milk and a2 Milk™
- a2 Milk™ may induce improvements in protein digestion and AA absorption in LI individuals relative to conventional milk

Methods

Screening



Intervention



Sample Collection & Analysis

- ✓ Fasting and postprandial blood samples were collected up to 3 hrs
- ✓ Blood glucose and insulin were measured by colorimetric assays
- ✓ Circulatory free AA was analysed by ultra-high pressure liquid chromatography (UPLC)

Results

Baseline subject characteristics

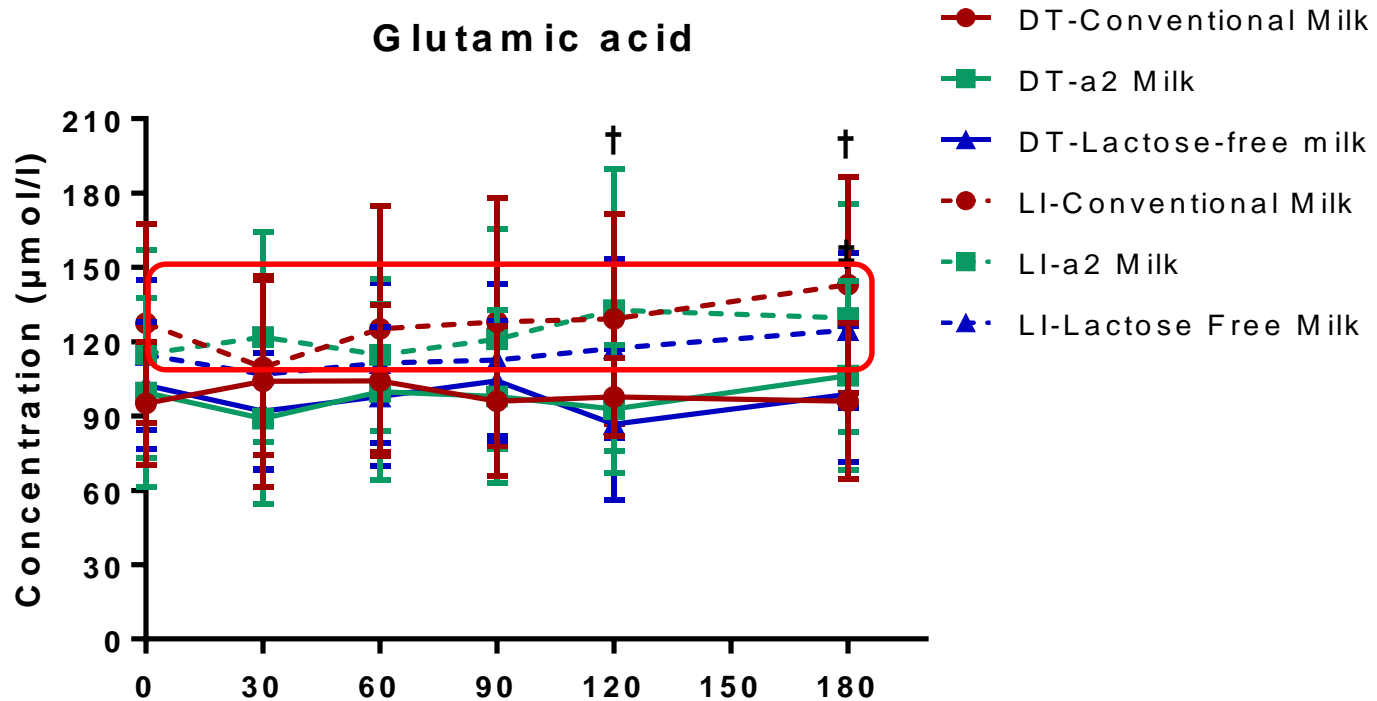
	Dairy Tolerant	Lactose Intolerant
N	10	10
Age (Years)	25 ± 1	27 ± 1
BMI	24.5 ± 1.1	22.9 ± 0.9
TG (mmol/l)	1.16 ± 0.15	1.17 ± 0.16
Glucose (mmol/l)	5.47 ± 0.14	5.48 ± 0.35
Insulin (mU/l)	12.08 ± 2.10	10.89 ± 1.26
HOMA-IR	2.91 ± 0.47	2.54 ± 0.35

Values represent means ± SEMs. BMI: body mass index; TG: triglyceride.

TG and glucose were measured from plasma whereas insulin was measured from serum.

- Response to all the milk types:

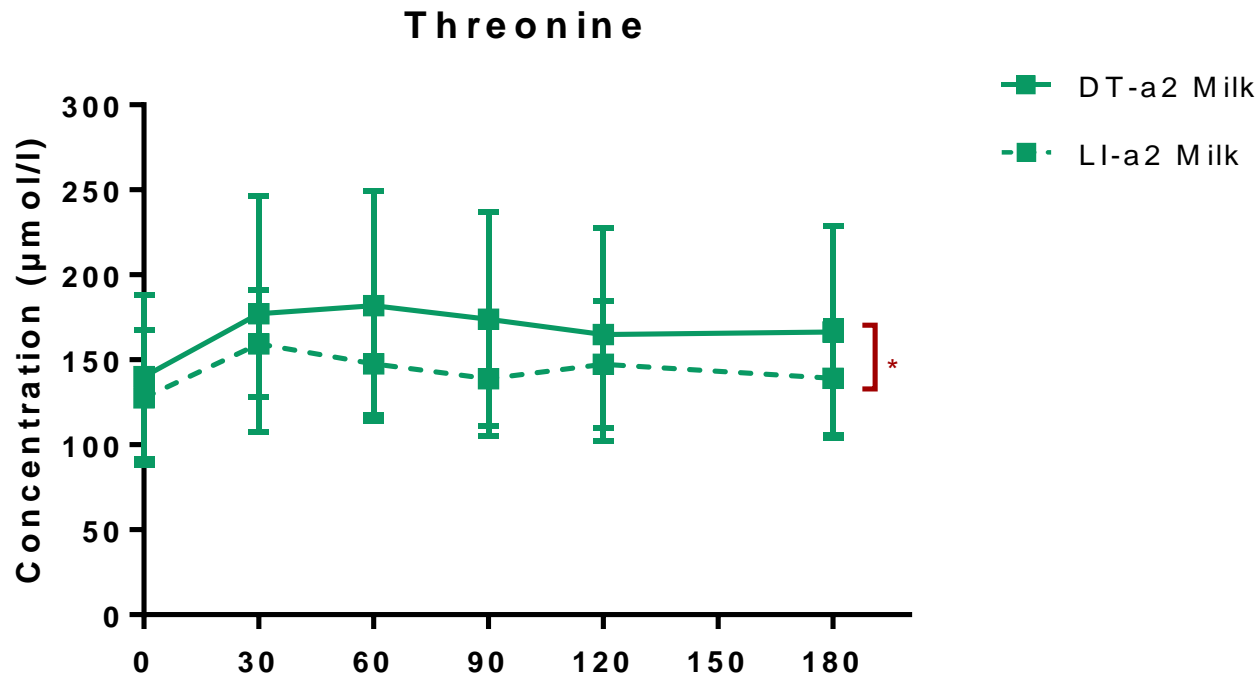
LI group had higher plasma concentrations of **glutamic acid** than DT group ($p < 0.05$ each, respectively)



† Significantly different in response to conventional milk between the groups

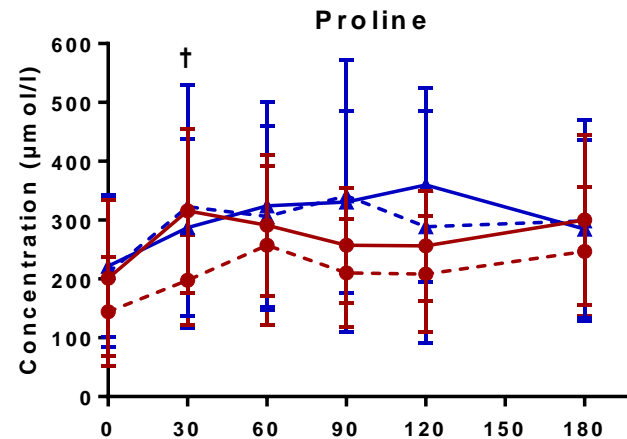
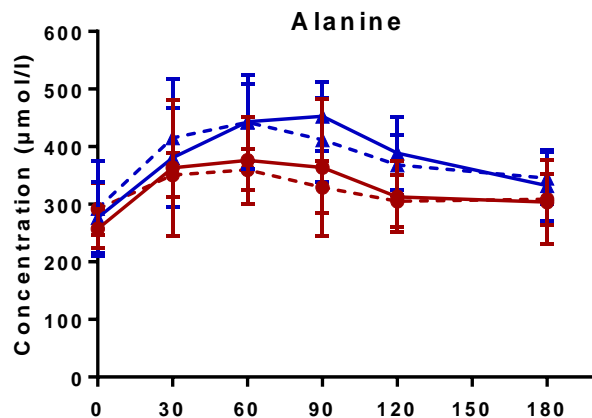
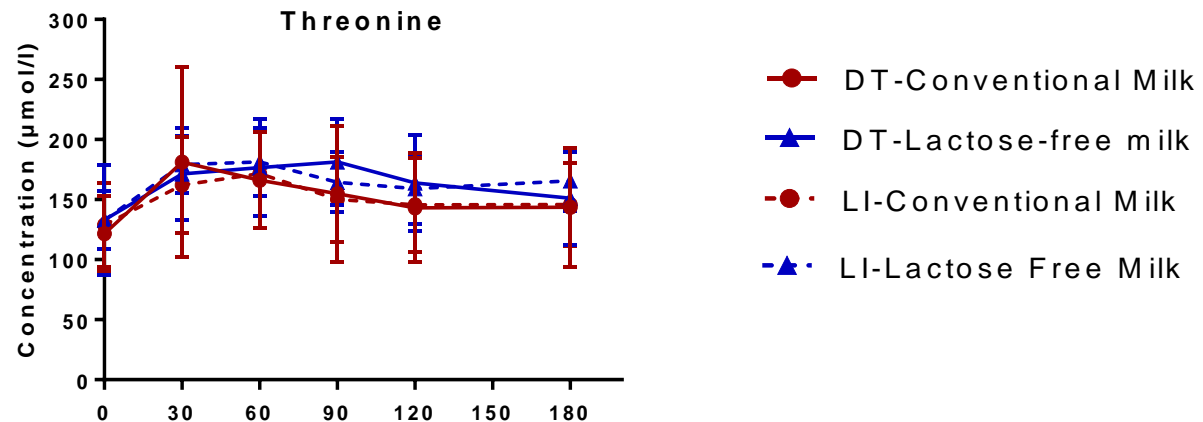
- Response to a2 Milk™:

DT group had higher circulatory concentrations of **threonine** compared to LI group ($p < 0.05$)



- Lactose-free milk > conventional milk:**

Both groups had higher plasma concentrations of **threonine**, **alanine** and **proline** ($p < 0.05$ each, respectively)

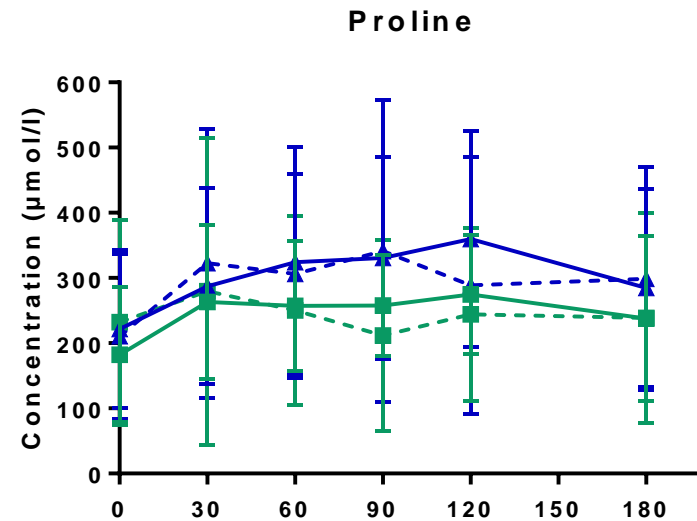
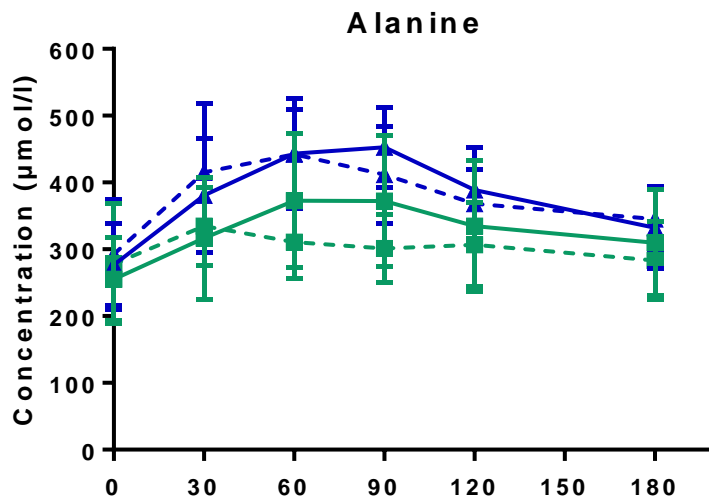


†Significantly different in response to conventional milk between the groups

- Lactose-free milk > a2 Milk™:

Both groups had higher plasma concentrations of **alanine** and **proline** ($p < 0.05$ each, respectively)

- DT-a2 Milk
- DT-Lactose-free milk
- LI-a2 Milk
- LI-Lactose Free Milk

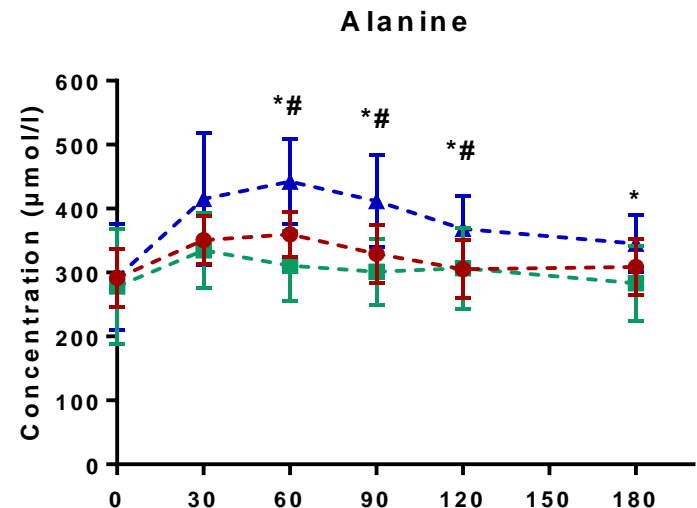
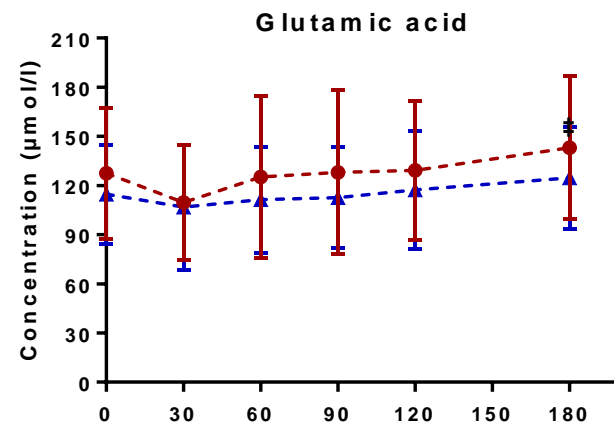
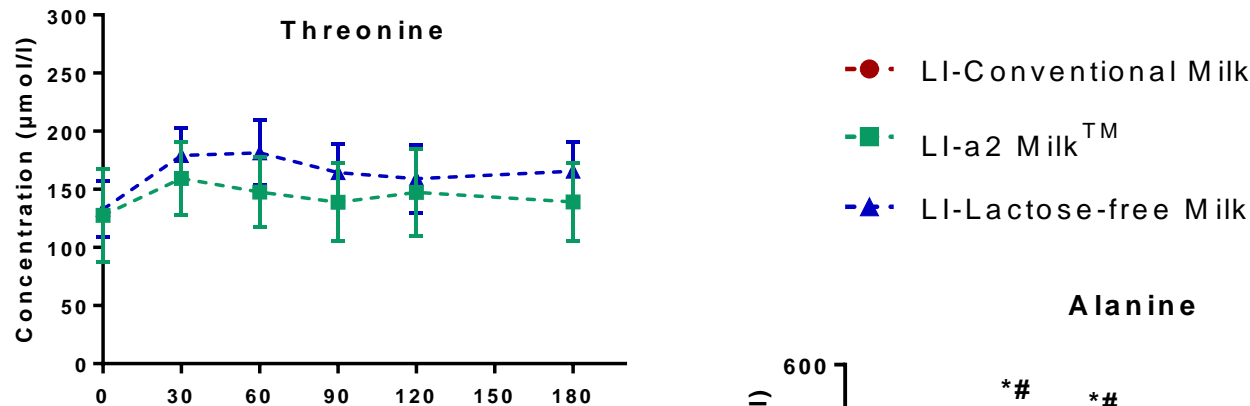


• In Lactose Intolerant Group:

Threonine- Lactose-free milk > a2 MilkTM ($p<0.05$)

Glutamic acid- Conventional milk > Lactose-free milk ($p<0.05$)

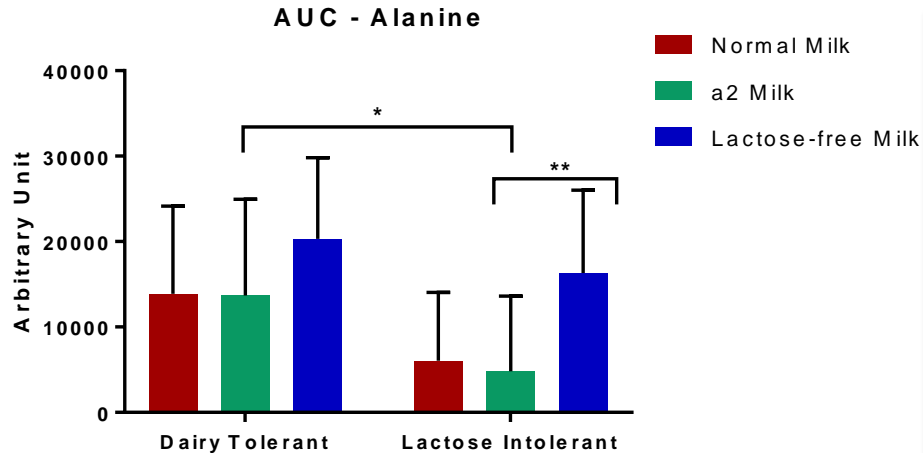
Alanine- Lactose-free milk > Conventional milk > a2 MilkTM ($p<0.05$)



*Significantly different between lactose-free milk and conventional milk

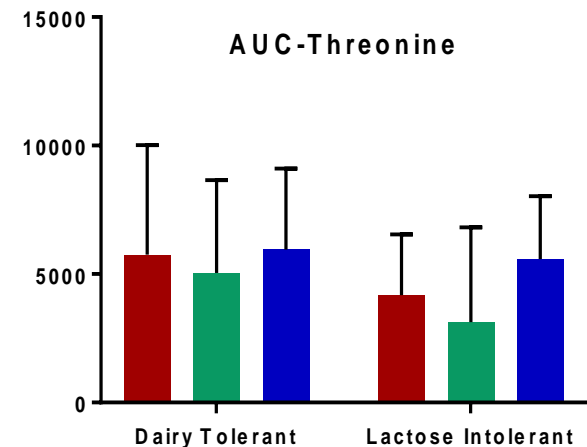
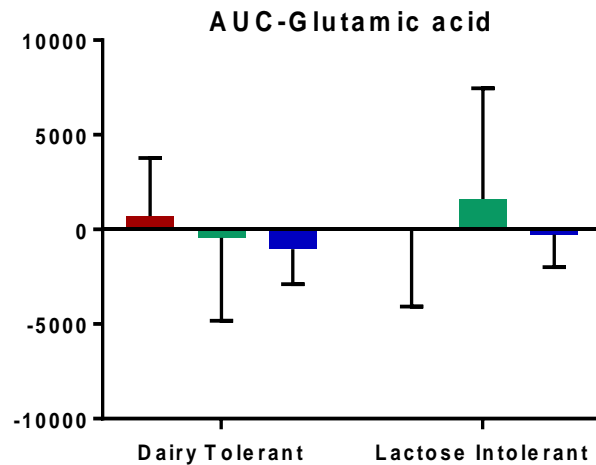
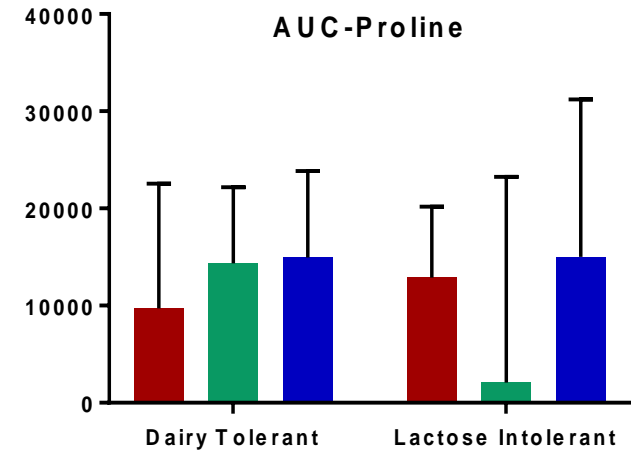
#Significantly different between lactose-free milk and a2 MilkTM

Only Alanine AUC was significant !

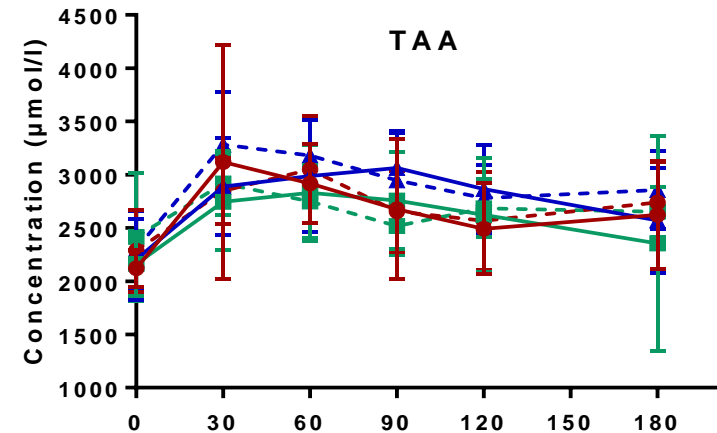
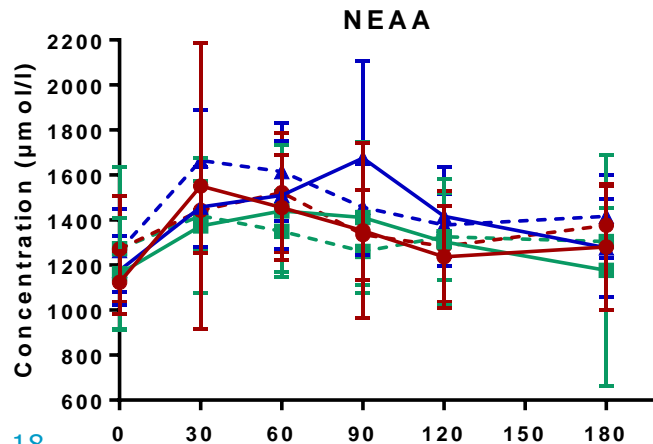
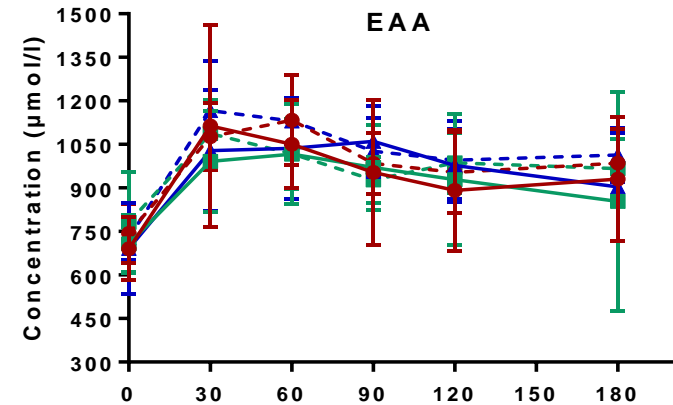
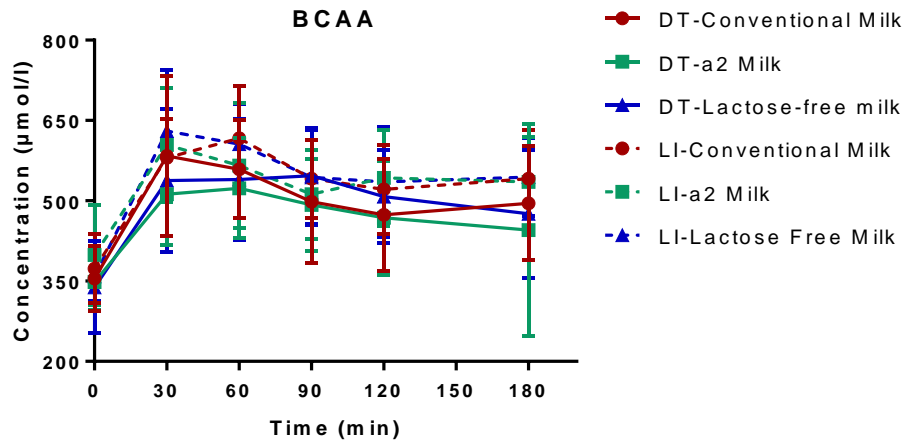


*Significant difference in response to a2 Milk™ between the groups

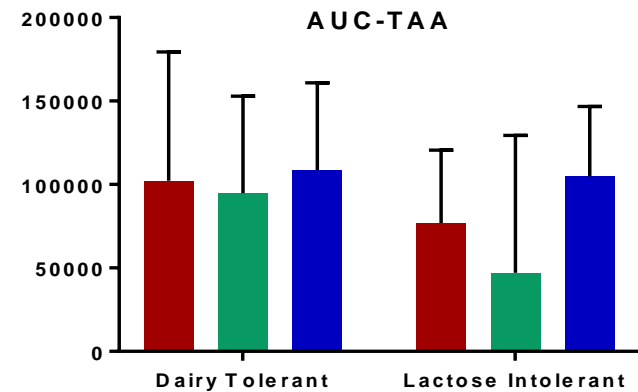
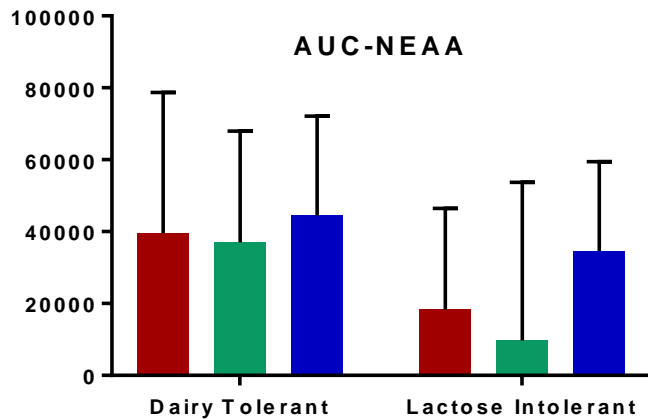
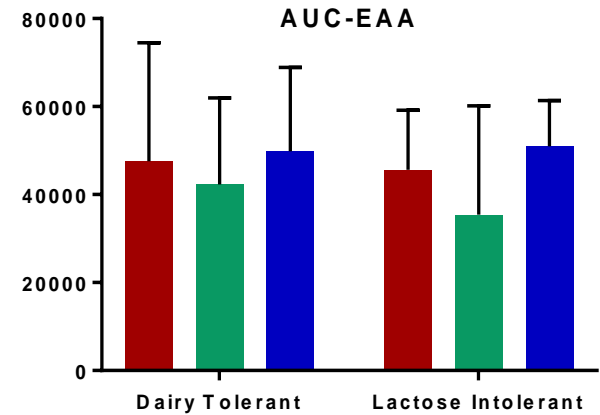
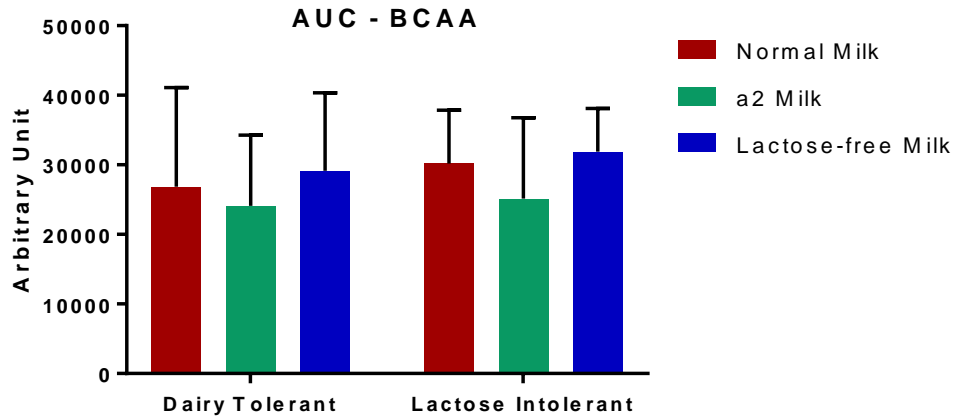
**Significant difference in LI group between lactose-free milk and a2 Milk™



None of the grouped AAs differed between or within the groups in response to milk types



AUC of the grouped AAs followed similar pattern in response to specific milk types



Conclusions

- Lactose intolerance has little impact on postprandial plasma levels of specific AAs
- This response did not differ between conventional or a2 Milk™
- Lactose-free milk altered protein digestibility

Future studies

- Impact of chronic exposure to β -casein variants in ameliorating lactose intolerance conditions
- Examine the differences in gastrointestinal transit time due to different milk ingestion

Benefits outweigh the costs!!!



Acknowledgement

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Dr Amber Milan

Dr Matthew Barnett

DCS Lab group

Eric Thorstensen



National
SCIENCE
Challenges



The
a2 Milk
Company™



agresearch
āta mātai, mātai whetū

